

Laser Femto-Tesla Magnetic Gradiometer (LFMG), Phase II

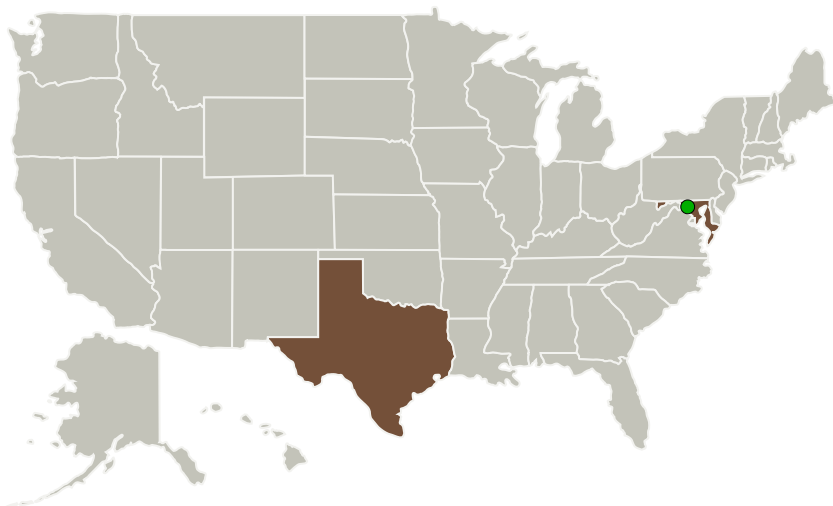
Completed Technology Project (2010 - 2012)



Project Introduction

The LFMG instrument is used to make extremely high resolution scalar magnetic field and difference measurements at the Earth's surface. The Phase 1 effort included development of a conceptual design and established the feasibility of designing, fabricating and demonstrating in Phase 2 two prototype LFMG instruments for use in a gradiometer configuration. The Phase 1 LFMG conceptual design includes a technical plan for approaching 10 fT/√Hz resolution in the LFMG prototype. The breadboard LFMG demonstrated measurements of scalar field variations with a resolution of 45 fT/√Hz in Phase 1. The LFMG has stability required to measure vector gradients (difference of scalar measurements between two LFMG instruments on the Earth's surface) with very high stability over distances of the order of kilometers. The LFMG prototype will have a dynamic range of 25,000 nT to 75,000 nT, and achieves an accuracy and stability necessary to perform common mode noise rejection between two LFMG instruments. This advance in the state of the art represents an increase in sensitivity of more than an order of magnitude, and will permit new high performance gradiometer measurements for use in innovative exploratory research into the effects producing temporal variations in the magnetic field over the Earth's surface.

Primary U.S. Work Locations and Key Partners



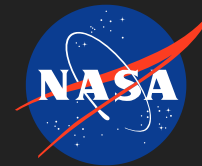
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Organizations Performing Work	Role	Type	Location
Polatomic, Inc.	Lead Organization	Industry	Richardson, Texas
● Goddard Space Flight Center(GSFC)	Supporting Organization	NASA Center	Greenbelt, Maryland

Primary U.S. Work Locations	
Maryland	Texas

Project Transitions

**January 2010:** Project Start**April 2012:** Closed out**Closeout Documentation:**

- Final Summary Chart(<https://techport.nasa.gov/file/139149>)

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Polatomic, Inc.

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

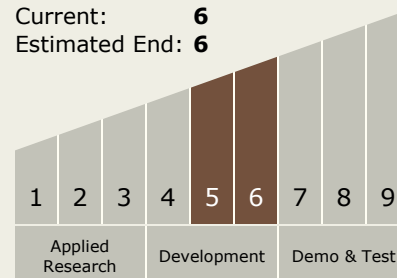
Carlos Torrez

Principal Investigator:

Jean H Isham

Technology Maturity (TRL)

Start: 5
 Current: 6
 Estimated End: 6



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Technology Areas

Primary:

- TX08 Sensors and Instruments
 - └ TX08.3 In-Situ Instruments and Sensors
 - └ TX08.3.1 Field and Particle Detectors

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System